REMARKS

In the amendments above, Claims 1, 11, and 12 have been amended, Claims 13 to 18 have been cancelled, and new Claims 25 to 40 have been added to more particularly point out and distinctly claim Applicant's invention.

Newly added Claims 24 to 40 are substantially based upon claims 1 to 23. It should be noted that that these newly added claims are essentially directed to an aspect to Applicant's invention, namely, the enhancement of a pattern in a reticle, that was previously embodied in claim 1 but is believed better set forth in separate claims.

Co-pending U.S. patent application Serial No. 09/694,429 was mentioned on page 5 of the previous Amendment. Applicant appreciates the examiner's having cited the patent that issued from said application, namely Oshemkov et al., U.S. Patent No. 6,625,181.

Claims 13-18 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. The Examiner's attention is directed to the amendments above, wherein Claim 13 has been amended.

Claims 1-4 and 9-12 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Hongo et al. '759 ("Hongo") and Haight et al., "MARS: Femtosecond Laser Mask Advanced Repair System In Manufacturing", J Vac. Sci. Technol. B 17(6) pp 3137-3143 (Nov/Dec 1999) ("Haight"), and Claims 1-5 and 9-12 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Hongo and Haight in view of Lou et al. '272 ("Lou"). Claims 1-4 and 9-18 have been rejected under U.S.C. §103(a) as being unpatentable over Hongo and Haight in view of Gelbart et al. '818 ("Gelbert"); Claims 1-4, 9-13, 16 and 16 have been rejected under 35 U.S.C. §103(a) as being unpatentable over

Hongo and Haight in view of Zhang et al., "Study Of Microprocessing Of Glass...", Proc. SPIE vol. 3933 pp. 332-337 ("Zhang") and Okamoto '606 ("Okamoto"); and Claims 1-4 and 6-12 have been rejected under 35 U.S. C. § 103(a) as being unpatentable over James et al. '200 ("James") combined with Hongo and Haight in view of Jensen et al. '718 ("Jensen").

Applicant respectfully traverses the above rejections.

Hongo teaches the processing of photomasks to remove defects where the laser beam passes through the transparent substrate. However, the backside irradiation described herein is of nanoseconds duration, which is five orders of magnitude greater than femto-second lasers' technology. In atomic relaxation times, nanoseconds time durations are considered as nearly continuous, and therefore constitute a completely different field.

The slight reduction of thermal effects at below 20 nanoseconds is known to be orders of magnitude larger than femto-seconds' laser induced damage zones, and that is well described in Haight.

Moreover, in contrast to Haight, where a method of ablation of chrome by femto-second laser describes the laser beam as being focused in air, and in accordance with the present invention, focusing a laser radiation through transparent media is accompanied by The Kerr effect with self-focusing inside the substrate. A damage zone inside quartz or fused-silica is created by nearly ten-fold more laser energy then what is required to ablate chrome off a surface.

Therefore, by reducing energy considerably, to a level of tens of nanojoules, at focus, no intra-volume scattering center is created on one hand, but a self-focusing which results in surface ablation microns away from focal plane, results on the other hand. Such

self-focusing leads to the possibility of directing the laser beam many microns away from surface target, and achieving the desired pattern, with less debris and better control of damage zone size and shape.

Gelbart teaches ablation of coating material to form phase shift elements. More particularly, Gelbert proposes making slight physical modifications to the edges of the pattern by removing coating material in a predetermined manner to cause phase shifting (and to compensate for edge effects). In contrast, this application teaches intra-volume damage zone as a means to form phase shift masks. Phase shift elements are introduced inside the substrate itself, with no ablation. The proposed optical elements form scattering centers within the transparent media.

Zhang and Okamoto teach ablation of material or coating to form phase shift elements, wherein the pattern is physically altered to obtain the phase shift effect. In contrast, the present application teaches intra-volume damage zones as a means for forming phase shift masks. Phase shift elements are introduced inside the substrate itself, with no ablation.

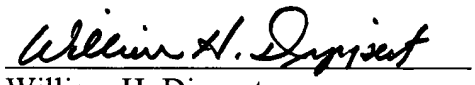
The method disclosed in the present invention would definitely not be obvious to a person skilled in the art familiar with Hongo, Haight, Lou, Gelbart, Zhang, and Okamoto. It should be noted that Claim 1 explicitly refers to the use of "ultra-short" laser irradiation.

In sum, the claims herein are not unpatentable under §103(a) over any reference or combination of references cited by the Examiner. Therefore, the rejections under §103(a) should be withdrawn.

Should the claims herein be allowable but for a matter that could be the subject of an Examiner's Amendment or a supplemental submission, Applicant would appreciate the Examiner's contacting Applicant's undersigned Attorney of record.

Reconsideration and allowance of all the claims herein are respectfully requested.

Respectfully submitted,



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